Argo Australia National Report 2017

(Report prepared for the AST-19, by Peter Oke, for the Argo Australia team: Rebecca Cowley, Esmee Van Wijk, Craig Hanstein, Pat McMahon, Catriona Johnson, Tatiana Rykova, Jenny Lovell, Beatrice Pena Monilo, Lisa Krummel, Joel Cabrie, Susan Wijffels)

7 March 2018

Goal

The goal of Argo Australia is to maintain 50% of the core Argo array around Australia – and contribute significantly to the maintenance of the core array in the Indian Ocean and Pacific Ocean sectors of the Southern Hemisphere.

Organisation

Argo Australia are undergoing a transition period, with key leaders moving on. Susan Wijffels established Argo Australia and has led the Australian efforts since the beginning of the Argo Program. Susan has moved to WHOI, joining the US Argo effort – but still engaged in supporting Argo Australia. Ann Thresher has managed Argo Australia's real-time (RT) operations since Argo Australia was established. Ann has retired. Peter Oke has taken over as leader of Australian Argo. Peter's background is in ocean data assimilation, forecasting, and reanalysis. Rebecca Cowley has taken over management of RT operations. Rebecca has long been involved in RT activities – both for Argo and Australia's XBT program.

The Delayed Mode Quality Control (DMQC) operations of Argo Australia has been reviewed, with a new approach adopted. The DMQC operations is now led by a senior DMQC operator with oversight over throughput and decision-making (checking for consistency), and the throughput is now undertaken by a team of DM operators (working no more than 2-days a week on DMQC).

Argo Australia currently fund a total of 3.45 FTEs, including: Oke (Leadership, Science: 0.5 FTE), Cowley (RT operations: 0.5 FTE), Van Wijk (DM operations: 0.55 FTE), fractional allocations of individuals for DM throughout (Johnson, Lovell, Rykova, Doyle: 1.4 FTE), and fractional allocations for software support (Wallace, Scott, Slawinski: 0.5 FTE).

Status

Argo Australia currently manage 361 operational Argo floats. The distribution of floats is indicated in Figure 1. This indicates that profiles from Argo Australia comprise about 34% of the global array in the 90^{o}-sector around Australia in the Southern Hemisphere. Recall the target for Argo Australia is 50%. US floats comprise over 50% of the profiles in this region.

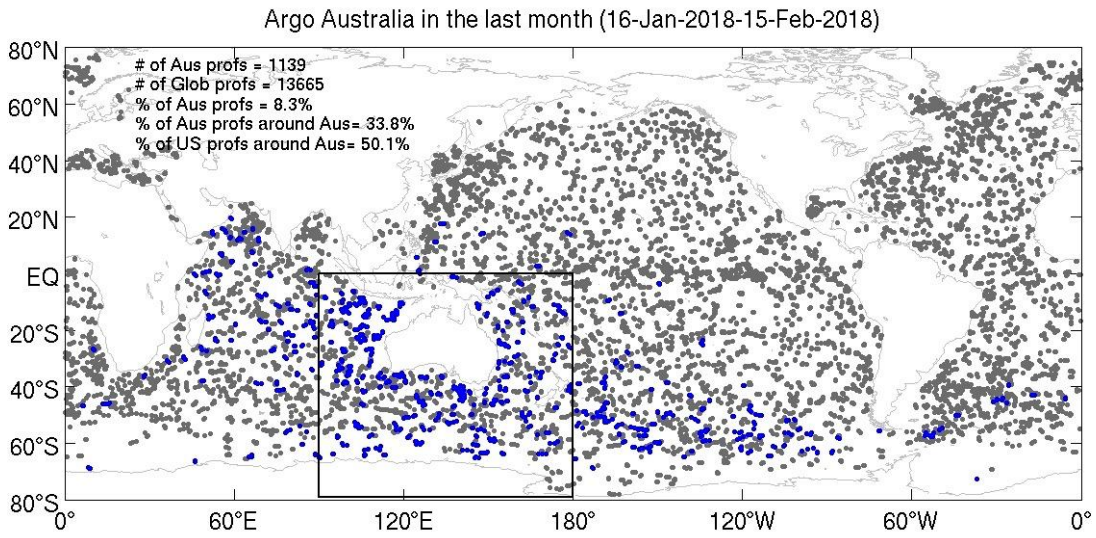

Figure 1: Location of all Argo profiles in the 30-day period between 16 January and 15 February 2018, showing the location of profiles from the global array (grey dots) and from Australian floats (blue dots).

In 2016-17, Australia deployed 51 floats, including 4 BGC floats.

Over 95% of data from Australian core Argo floats are published on the Global Telecommunications System (GTS) and the Argo Global Data Acquisition Centres (GDACs) within 24 hours of observation. The software for the Australia RT system has recently been rewritten (in Python). Two systems are currently operating in parallel to allow the new system to be tested. Subject to equivalent performance, the new code will soon be adopted for Australia's RT system.

The Argo Australia team undertook a detailed analysis of the failure modes of all Australian-deployed floats, together with an Intern, Benjiamin Briat. Results were presented at the Argo technical workshop in Seattle in September 2017, and can be found at http://www.argo.ucsd.edu/float_workshop_2017/Day_1/D1_Briat_fail_anal_csiro.pdf. Key findings included an understanding of the characteristics of engineering data that may give a hint of a pending failure of an Argo float. Diagnostics from all Argo floats are now derived routinely for all operational floats and monitored in RT and used in DM operations to support decision making. Another finding was recognition of the impact of deployment modes of floats, with floats deployed by vessels without scientific oversight, returning a greater number of floats that were dead-on-deployment.

DMQC throughput for Argo Australia is good, with about 95% of eligible floats processed through our DMQC system. The DMQC code that underpins Argo Australia's DM operations is now stable, and adequately serving DM purposes.

The Argo array around Australia is aging, with many floats older than 4.5 years located north-east of Australia (Figure 2Figure 3), indicating that a gap in the core array may soon

emerge off north-eastern Australia in the absence of targeted deployments. It is expected that this emerging gap should be somewhat filled by upcoming deployments off the RV Kaharoa (with a mix of Australian and UW floats).

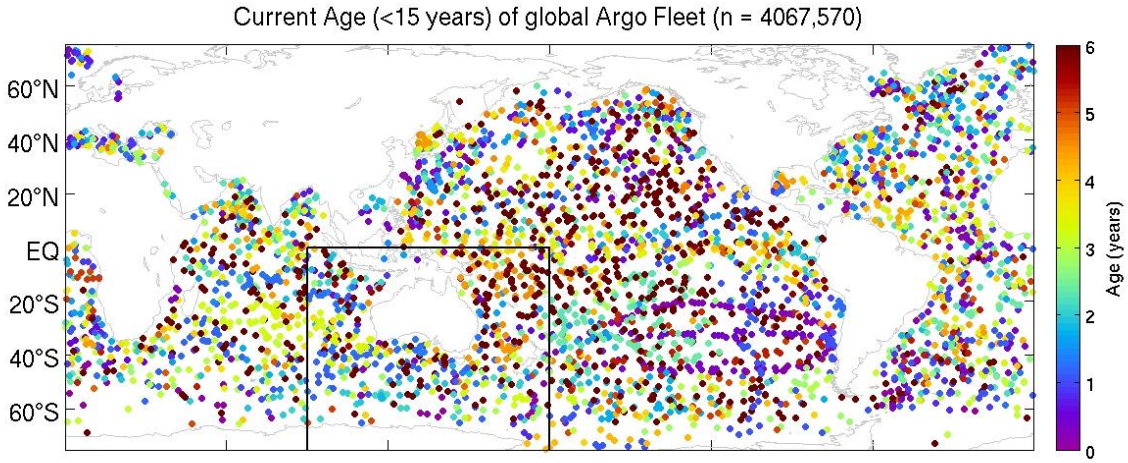

Figure 2: Location of Argo floats, colour-coded by age (time since deployment).

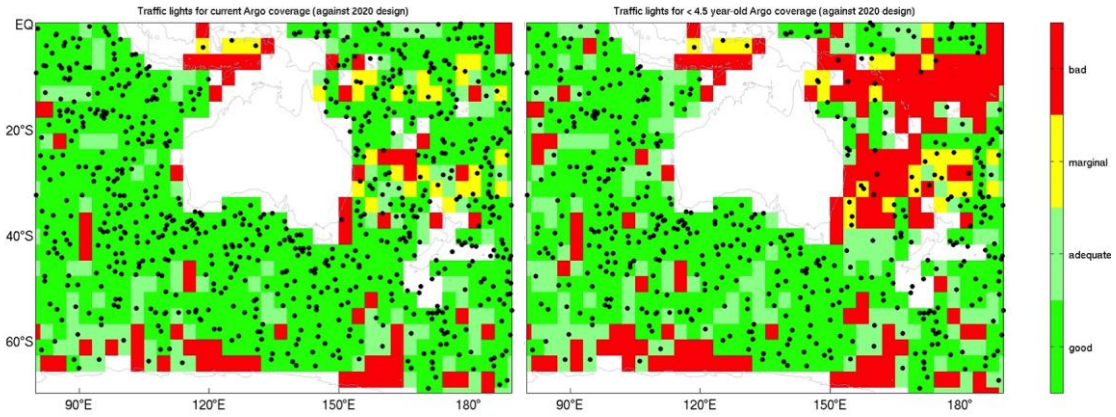

*Figure 3: Traffic lights for the current Argo array for the sector around Australia – using the Argo 2020 design as the target - for all current floats (left) and all current floats younger than 4.5 years (right). Maps are similar to the JCOMM-OPS "heat maps" – but assume a "footprint" for each float of 1^o. Coverage is considered **good**, **adequate**, or **marginal**, if the number of floats in each $3x3^o$ box exceeds, matches, or is within one float of the target Argo 2020 design. Coverage is considered **bad** if the number of flats is less than 2 floats of the target.*

Plans

Argo Australia are committed to deploy 59 floats in the next year – but are hoping to secure funding for an additional 70-80 core floats over the next two years. Funding for additional floats is expected to be confirmed in April 2018.

Approximate deployment locations are shown in Figure 4. We will utilise ships from the Australian Navy, commercial ships of opportunity, the RV Kaharoa charter, RV Tangaroa, the RV Investigator, Aurora Australis, the Thompson and other opportunities that become available.

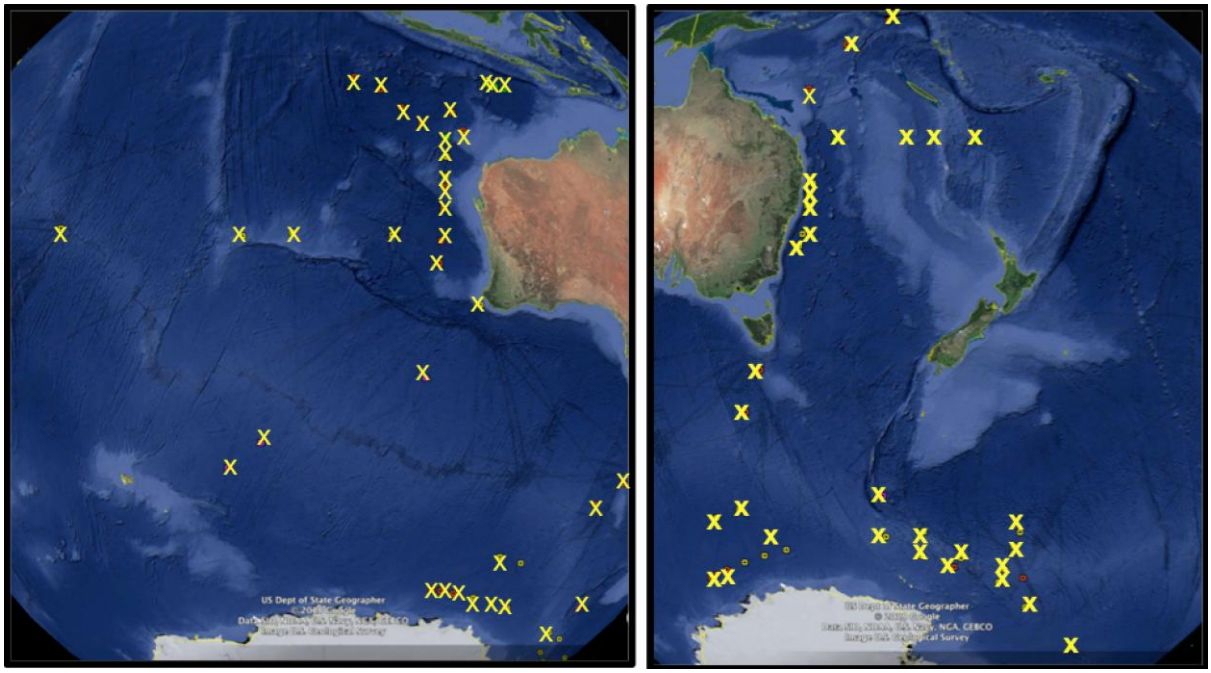

Figure 4: Approximate locations of planned deployments.

Argo Australia has funding for human resources secured until June 2019 – and expects funding at current levels to be maintained.

Argo Australia is exploring the feasibility of developing an online portal for DM operations – akin to a community DM system.

Argo Australia are conducting a field experiment to compare the performance of Seabird and RBR CTDs on the RV Investigator in April 2018.

Argo Australia are currently developing a suite of new analysis tools that are intended to routinely produce global maps of ocean properties, exploiting data assimilation tools developed under the Bluelink (ocean forecasting) project.

Data uptake

Argo data are used to underpin Australia's operational ocean forecast system (OceanMAPS: http://www.bom.gov.au/oceanography/forecasts/index.shtml) and seasonal prediction system (POAMA/ACCESS-S: http://poama.bom.gov.au).

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